

TCS Arraying and Rigging

This document explains how TCS loudspeakers can be arrayed and the reasons for the rotatable horns in some models. The TCS-122 and TCS-152 both feature Turbosound's unique Dendritic high frequency waveguide. This can be rotated for two reasons:

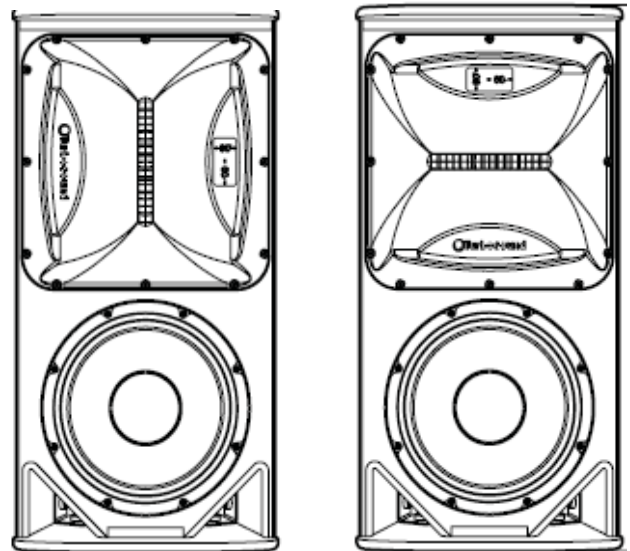
1. To allow a single speaker to be mounted horizontally but still retain the wider horizontal pattern, or
2. To allow two or more speakers of the same to be arrayed with minimal interference

The second application is explained here in detail.

One of the benefits of the Dendritic waveguide is its exceptional coverage pattern and sharp edge-of-pattern cut-off as demonstrated in Flex Array. The sharp cut-off works either vertically or horizontally, depending on which way the horn is rotated.

To explain this further, the TCS-122 and TCS-152 feature exceptional pattern control either left/right or up/down depending on how the horn is rotated. This allows them to be arrayed with adjacent speakers without lobes or destructive interference. So the true arrayable benefit of the Dendritic is *in the physical plane of the Dendritic device* i.e. either left/right or up/down depending on orientation. The other plane of the Dendritic device functions in a similar way to a standard horn.

The diagram here shows a TCS-122 with the horn in two possible orientations. The one on the left is the typical orientation, so for example the TCS-122/94 model has a dispersion pattern of 90 degrees wide by 40 degrees in the vertical. The box on the right shows the box with the horn rotated to give 40 degrees in the horizontal and 90 degrees in the vertical.

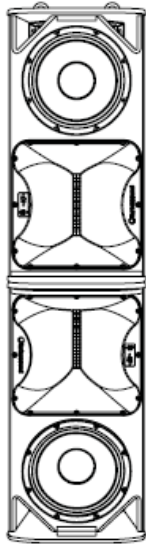


So the speaker on the left has a very controlled vertical pattern, whereas the one on the right (the same speaker with the HF horn rotated) has a very controlled horizontal pattern.

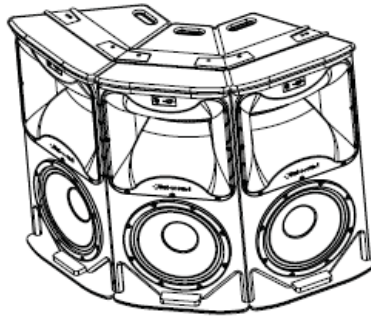
The TCS-122 and TCS-152 are both available with three dispersion options: 60° x 40°, 90° x 60° and 60° x 40°. However note that only the 40 degree boxes benefit from being tightly arrayed, i.e with the sides touching. So in a cluster of two or three tight packed boxes, you should use either the 60° x 40° or 90° x 40° models and the horns should be orientated to give 40° dispersion in the horizontal plane.

The TCS-122 and TCS-152 are double trapezoidal boxes and it is this feature, in combination with the rotatable horns that gives you the flexibility to build so many cluster options. The simple rule is that the side that is touching the adjacent speaker needs to be orientated to 40 degrees.

The following options only apply to TCS-122 and TCS-152 models with Dendritic horns. The TCS-1561 and TCS-61 use conventional horns.



In this example the TCS-122/94 loudspeakers with horns in the standard 90° x 40° orientation are tight packed vertically horn-to-horn, providing a combined coverage of 90° horizontal by approximately 80° vertical, with a useful vertical beam and a mid-range lobe that projects well down a longer, thinner room.



The HF horns in this horizontal array of TCS-122/94 boxes have been rotated to give individually 40° horizontal by 90° vertical. The horizontal coverage patterns add up to give combined dispersion of 120° horizontal by 90° vertical.



This example shows how the same coverage pattern as the vertical array on the far left can result from a completely different physical array. The HF horns are rotated to give 40°h x 90°v and then the whole array is assembled horizontally to give combined coverage of 90° horizontal by 80° vertical.

These examples are based on the 90° x 40° model. If using the 60° x 40° models, a further three coverage pattern options of 60° x 80°, 120° x 60°, and 60° x 80° would be available to you, depending on the shape of the room.

Rigging options

All of the TCS boxes have rigging points on the top, bottom and both sides, so they can be mounted practically any way you like. For example, one option is to mount a single TCS-122 upside down to get the HF waveguide closer to the audience.

Flying single boxes

This can be simply achieved with M10 eyebolts, WB-20 and WB-55 wall brackets, CB-55 ceiling brackets, and OmniMount™ speaker brackets, for which bolt patterns are provided on the back of the

cabinets where appropriate.

Flying multiple cabinets

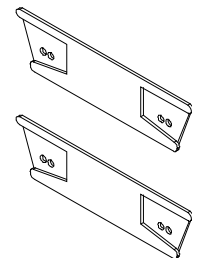
When creating loudspeaker arrays the essential components are a pair of steel flyplates fitted to the sides of each flown cabinet, ensuring that all the rigging is steel-to-steel without any load being taken through the cabinets' woodwork. Sets of joiners mate with the flyplates to connect one cabinet to the next adjacent cabinet.

Following is a summary of the kits required and their component parts.

FP-1 KIT 07G0335

Consists of a pair of steel flyplates that fit both the TCS-122 and TCS-152 cabinets. 1 x FP-1 kit is required for each cabinet that is to be arrayed.

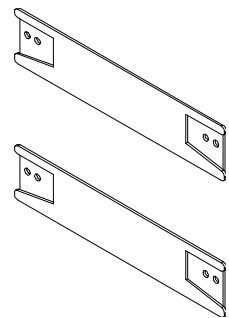
The FP-1 kit includes two flyplates, four M10 x 40mm bolts and four M10 spring washers.



FP-2 KIT 07G0340

Consists of a pair of steel flyplates for the flyable TCS-B15A and TCS-B15B subs. 1 x FP-2 kit is required for each sub cabinet. The TCS-B15A is dimensioned to fly with the TCS-122, while the TCS-B15B is dimensioned to fly with the TCS-152.

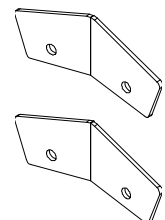
The FP-2 kit includes two plates, four M10 x 40mm bolts and four M10 spring washers.



With the flyplates installed on each box to be flown, now select the appropriate inter-cabinet couplers to connect the flyplates from one box to the flyplates of another.

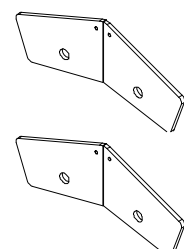
ICC-2H KIT 07G0345

A pair of steel inter-cabinet couplers for linking two TCS-122 cabinets together. The couplers fit into the recesses provided in the flyplates and are secured using the M10 bolts and washers that are supplied with the FP-1 flyplate kits.



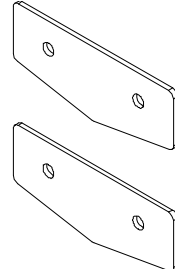
ICC-3H KIT 07G0350

A pair of steel inter-cabinet couplers for linking two TCS-152 cabinets together. The couplers fit into the recesses provided in the flyplates and are secured using the M10 bolts and washers that are supplied with the FP-1 flyplate kits.



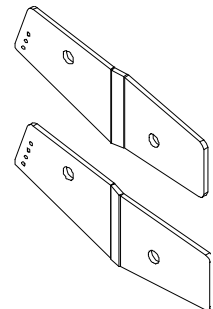
ICC-4H KIT 07G0355

A pair of steel inter-cabinet couplers for linking two TCS-B15 subs together. These can be either TCS-B15A or TCS-B15B versions, but in a cluster both subs should be the same type. The couplers fit into the recesses in the flyplates and are secured using the M10 bolts and washers that are supplied with the FP-2 flyplate kits.



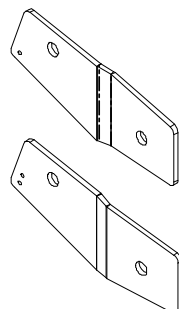
ICC-5H 07G0360

A pair of steel inter-cabinet couplers for linking a TCS-152 cabinet to a TCS-B15B sub. Each box needs their respective FP-1 and FP-2 flyplate kits of course. The couplers are handed i.e. there are left and right versions. The couplers fit into the recesses in the flyplates and are secured with the M10 bolts and washers that are supplied with the FP flyplate kits.



ICC-6H 07G0365

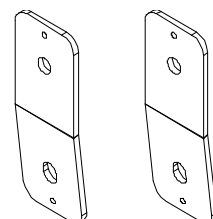
A pair of steel inter-cabinet couplers for linking a TCS-122 cabinet to a TCS-B15A sub. Each box needs their respective FP-1 and FP-2 flyplate kits of course. As with the ICC-5H kit, the couplers are handed left and right. The couplers fit into the recesses in the flyplates and are secured with the M10 bolts and washers that are supplied with the flyplate kits.



ICC-2V 07G0330

A pair of steel inter-cabinet couplers for flying two TCS-122 or TCS-152 cabinets in a vertical column with one cabinet inverted to position the horns adjacent to each other. FP-1 kits are not needed to assemble this configuration; all that is required is one ICC-2V kit per hang.

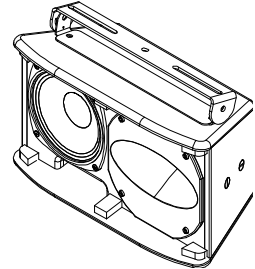
The kit includes two plates, four M10 x 40mm bolts and four M10 spring washers.



SB-61 07G0375

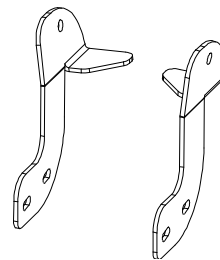
The SB-61 is a swivel bracket used to hang the TCS-61 in standalone applications such as ceiling mounting in bars or clubs, or as an under-balcony fill. It consists of two parts: a ceiling plate and a speaker plate, allowing each part to be fixed individually and then assembled and angled to achieve the desired coverage.

The SB-61 can also be used to hang the TCS-61 underneath the wider TCS-152 cabinet, with the facility to alter the downward angle.



ICC-61 07G0370

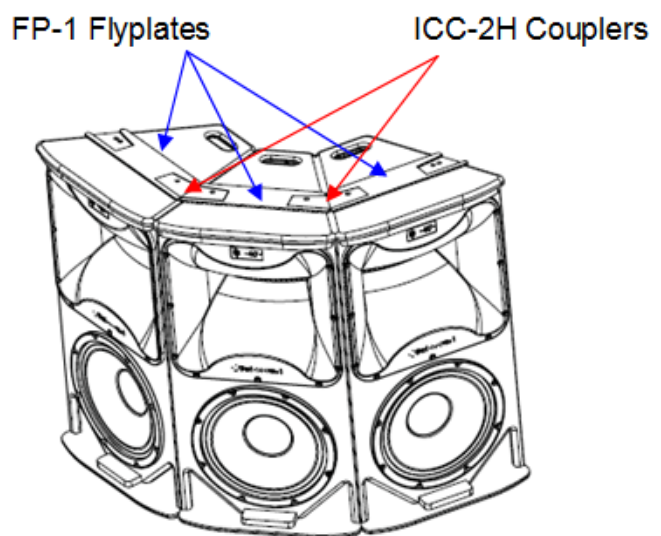
To hang the TCS-61 as a downfill speaker underneath the TCS-122, you will need a pair of ICC-61 inter-cabinet links fitted between the cabinets which positions the TCS-61 at an optimum angle to the TCS122.



Following are some diagrams that illustrate these components and kits in action.

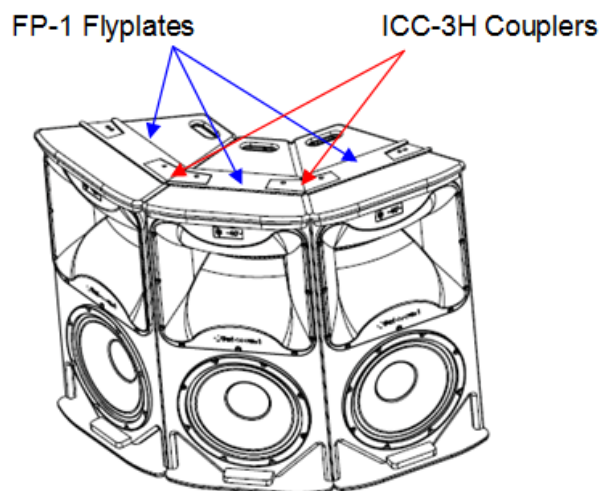
In this example cluster three TCS-122 cabinets are tight packed together using FP-1 flyplates on top and bottom and tied together with ICC-2H couplers. The horns are rotated to 40°h by 90°v and the cluster produces combined coverage of 120°h by 90°v. Pick up the array using M10 eyebolts attached to the inside flypoints on the two outer boxes. Parts required:

- 3 x FP-1 kits (6 pcs)
- 2 x ICC-2H kits (4 pcs)
- 2 x M10 eyebolts



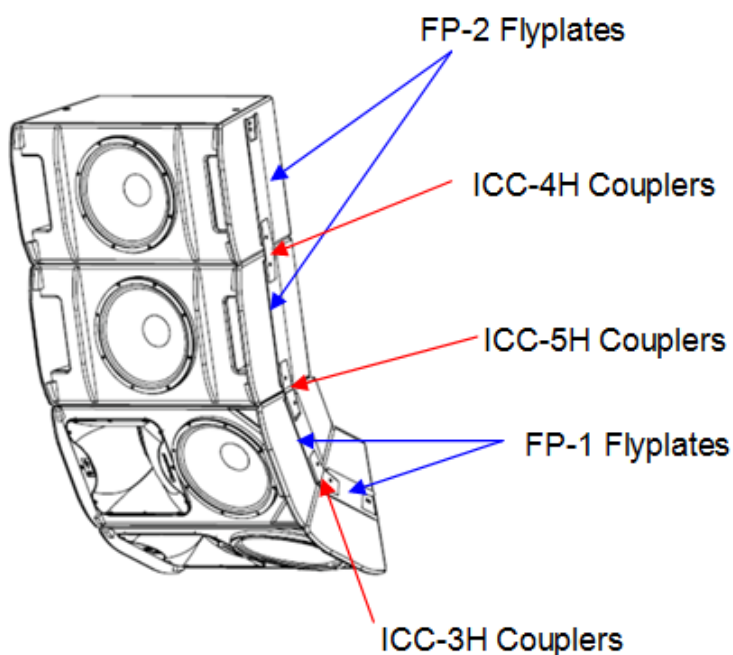
This cluster of three TCS-152 cabinets is assembled with FP-1 flyplates and ICC-3H couplers. Again the horns are rotated to 40°h x 90°v, giving combined cluster coverage of 120°h x 90°v. Parts required:

- 3 x FP-1 kits (6 pcs)
- 2 x ICC-3H kits (4 pcs)
- 2 x M10 eyebolts



This diagram shows how bass cabinets are combined in an array of TCS-152 cabinets. The mid/highs are fitted with FP-1 flyplates and the TCS-B15B bass cabinets with FP-2 flyplates. Three types of inter-cabinet couplers complete the cluster as shown. Parts required:

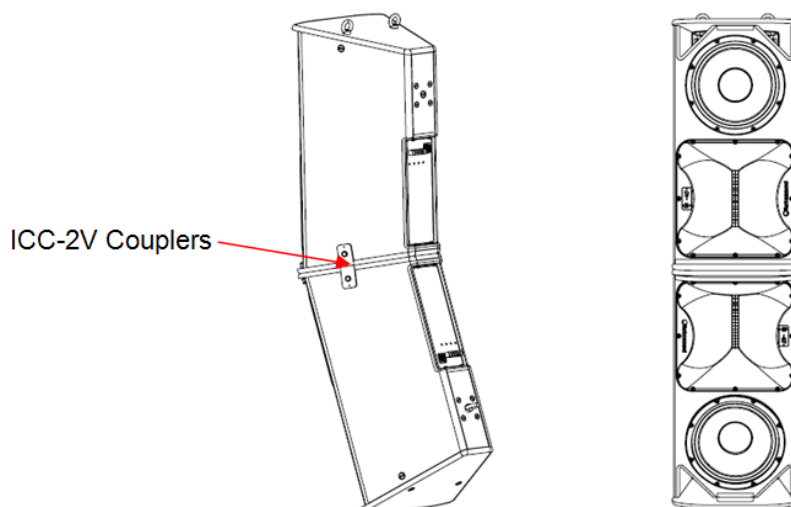
- 2 x FP-2 kits (4 pcs)
- 2 x FP-1 kits (4 pcs)
- 1 x ICC-4H kit (2 pcs)
- 1 x ICC-5H kit (2 pcs)
- 1 x ICC-3H kit (2 pcs)



A simple vertical hang of TCS-122 or TCS-152 cabinets with vertical couplers. The cluster is suspended on M10 eyebolts with a third eyebolt for a pull-back attached in the centre of the lower cabinet. Parts required:

1 x ICC-2V kit (2 pcs)

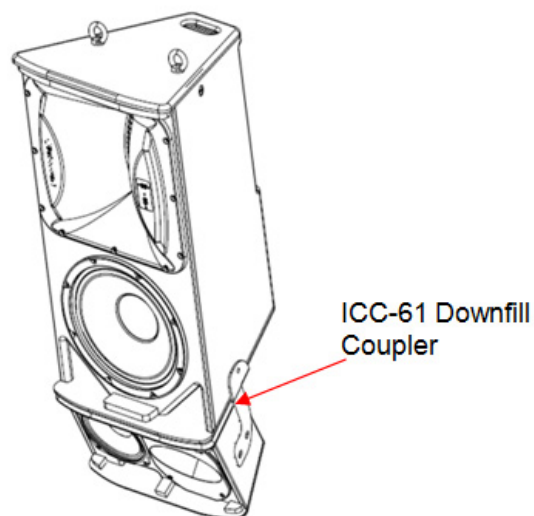
3 x M10 eyebolts



The TCS-61 shares the same width dimension as the TCS-122, providing an ideal visually discreet downfill application. The cluster is suspended with M10 eyebolts, with a further eyebolt in the centre of the TCS-122 as a pull-back. Parts required:

1 x ICC-61 kit (2 pcs)

3 x M10 eyebolts



Important notes on rigging

As with all rigging, the flying of these arrays should only be carried out by a professional rigger.

The Turbosound rigging system has been designed and constructed to a high standard of safety, and tested to the most demanding of specifications. In order to ensure the highest safety standards, this information on the assembly and safe use of rigging accessories must be understood and followed.

Only use Turbosound recommended rigging accessories, which are specifically designed for their intended purpose. Do not use Turbosound rigging with other types or brands of loudspeakers. This practice may compromise safety standards and Turbosound will not be responsible for damage or injury so caused. Do not modify the rigging accessories, or use them in a way other than that described in this user manual. Rigging components supplied as part of a complete assembly are non-interchangeable and must not be exchanged with the component parts of any other assembly. The component parts of a Turbosound rigging accessory must only be assembled using the fasteners and methods of assembly recommended in this guide. The use of fasteners and methods of assembly not specified or approved by Turbosound may result in an unsafe rigging assembly. Welding, or any other means of permanently fixing rigging components to each other or to cabinet fixing points is not allowed. Rigging assemblies must only be assembled using the appropriate parts and fixings as specified in this manual using the specific mounting instructions. Rigging components or assemblies must only be fixed to Turbosound loudspeaker cabinets using the cabinet fixing points, assembly methods and fasteners specified in this guide and the specific mounting instructions. When assembling the loudspeaker array ensure that all fixings are securely tightened before lifting the array.

Secondary Safeties

All loudspeaker clusters flown in theatres, studios or other places of work and entertainment must, in addition to the principle load bearing means of suspension, be provided with an independent, and properly rated and securely attached secondary safety. Only steel wire ropes or steel chains of an approved construction and load rating may be used as secondary safeties.

Safety Inspections

Carefully inspect rigging systems components and cabinets for defects or signs of damage before proceeding to assemble a flown array. If any parts are damaged or suspect, **DO NOT USE THEM.**

Regular, more rigorous test and inspection of rigging components must also be carried out. Safety legislation and test and inspection requirements will vary from country to country. In most cases, annual independent test and inspection by a suitably approved and qualified inspector will be required. Users must ensure compliance with all applicable safety requirements. Turbosound recommends regular safety inspections and further recommends that a logbook be kept detailing the test and inspection history of each Turbosound rigging accessory. Always wear protective headwear, footwear and eye protection in accordance with local regulations. Anyone involved in flying ANY sound system should take note of the following advice:

The rigging of a flown sound system may be dangerous unless undertaken by qualified personnel with the required experience and certification to perform the necessary tasks. Fixing of hanging points in a roof should always be carried out by a professional rigger and in accordance with the local rules of the venue. The house rigger and/or building manager must always be consulted.